Event Detection System Challenge

Background

The Water Security initiative is a U.S. Environmental Protection Agency program that addresses the risk of intentional contamination of drinking water distribution systems. Initiated in response to Homeland Security Presidential Directive 9, the overall goal is to design and deploy contamination warning systems for drinking water utilities. A contamination warning system is a proactive approach to monitoring for contamination through deployment of advanced technologies and enhanced surveillance activities to collect, integrate, analyze, and communicate information.

Water quality monitoring is one component of a contamination warning system and consists of a network of monitoring stations throughout a drinking water distribution system. Each station contains a suite of sensors that measure standard water quality parameters such as chlorine, total organic carbon (TOC) and pH. These parameters have been shown to change in the presence of many contaminants. However, the normal variability in distribution system water quality, coupled with the large amount of data, makes it a challenge to successfully detect transient contamination incidents. The proposed solution to this problem relies on event detection systems (EDS) containing algorithms of various degrees of sophistication to detect anomalous conditions.

The Challenge

As work in this field has been fairly limited to date, this study seeks to identify a wide range of EDSs currently available for event detection, challenge developers to optimize their EDSs using a variety of available data, and quantify performance of submitted EDSs over a wide range of detection scenarios. The basic format of the challenge will be:

* EPA will provide several months of water quality, alarm, and operational data from 5-6 monitoring stations from several utilities.
* Using the provided data, each participating team will develop and train an EDS to reliably detect anomalies at each station while producing few false alarms.
* EPA will test each EDS on normal utility data, as well as datasets with a variety of contamination events superimposed on the data. Each station will be analyzed individually.

Participants

Potential participants include researchers, software developers, product vendors, or anyone else with software capable of detecting anomalous conditions in drinking water. New EDS techniques can be developed, or existing anomaly detection or signal processing algorithms from other fields can be adapted to drinking water. The objective is to compare algorithms with a wide variety of analytical approaches.

Schedule

The schedule of events for the Event Detection System Challenge is outlined below. These dates are subject to change.

Date	Event
June 30, 2008	Test plan finalized and e-mailed to interested parties, participant registration begins
July 1 - October 1, 2008	All necessary materials, including training data and an interface application, are provided to registered teams
October 1, 2008	Final day to register
December 1, 2008	Last day to submit EDSs & associated materials
Spring 2009	Initial distribution of results to participants
Summer 2009	Initial public presentation of results

For Additional Information

For more information or to request a copy of the challenge rules, please contact Katie Umberg (umberg.katie@epa.gov).

More information on the Water Security Initiative and the contamination warning system concept can be found at http://cfpub.epa.gov/safewater/watersecurity/.